

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
25 January 2001 (25.01.2001)

PCT

(10) International Publication Number
WO 01/06016 A3

(51) International Patent Classification⁷: **C12Q 1/68,**
G01N 27/30

(21) International Application Number: PCT/US00/19889

(22) International Filing Date: 20 July 2000 (20.07.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/144,698 20 July 1999 (20.07.1999) US

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(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ,

DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR,
HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR,
LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ,
NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM,
TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

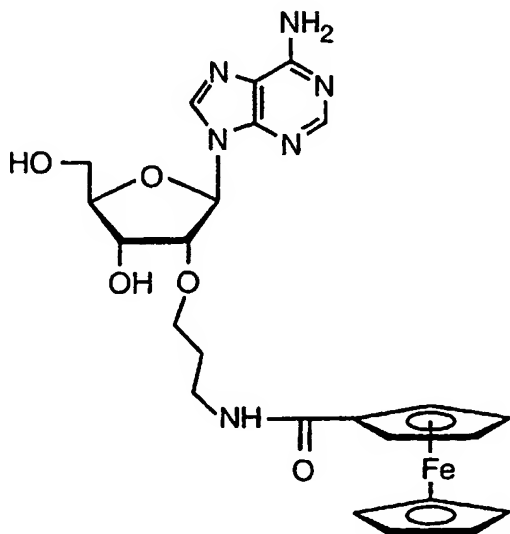
(84) Designated States (*regional*): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian
patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European
patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,
IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG,
CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— with international search report

(88) Date of publication of the international search report:
23 August 2001

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: AMPLIFICATION OF NUCLEIC ACIDS WITH ELECTRONIC DETECTION



(57) Abstract: The invention relates to compositions and methods useful in the detection of nucleic acids using a variety of amplification techniques, including both signal amplification and target amplification. Detection proceeds through the use of an electron transfer moiety (ETM) that is associated with the nucleic acid, either directly or indirectly, to allow electronic detection of the ETM using an electrode.

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 00/19889

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C12Q1/68 G01N27/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C12Q G01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, MEDLINE, EMBASE, CHEM ABS Data, BIOSIS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 98 20162 A (GOZIN MICHAEL ;YU CHANGJUN (US); KAYYEM JON F (US); CLINICAL MICRO) 14 May 1998 (1998-05-14) page 1-2; figures 29,32 page 9-10 page 27-29 page 35-37 page 41-43 page 51, line 15 -page 52 page 69, line 29 -page 70 ---	1-16
Y	US 5 854 033 A (LIZARDI PAUL M) 29 December 1998 (1998-12-29) column 2-14; figures 1,2,6,7,10 column 21 column 33 --- -/--	1-12

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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8 document member of the same patent family

Date of the actual completion of the international search

13 February 2001

Date of mailing of the international search report

20/02/2001

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INTERNATIONAL SEARCH REPORT

Int .tional Application No

PCT/US 00/19889

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 846 717 A (OLIVE DAVID MICHAEL ET AL) 8 December 1998 (1998-12-08) column 5-11; claims; figures 19,29 ---	13-16
A	BROWN G ET AL: "Metallorganic labels for DNA sequencing and mapping" NEW JOURNAL OF CHEMISTRY,FR,CNRS-GAUTHIER-VILLARS, MONTRouGE, vol. 18, no. 3, March 1994 (1994-03), pages 317-326, XP002106965 ISSN: 1144-0546 the whole document ---	1-16
A	WO 86 05815 A (GENETICS INT INC) 9 October 1986 (1986-10-09) page 12; claims; example 2 ---	1-16
A	WO 96 40712 A (CALIFORNIA INST OF TECHN) 19 December 1996 (1996-12-19) the whole document ---	1-16
A	UTO Y ET AL: "Electrochemical analysis of DNA amplified by the polymerase chain reaction with a ferrocenylated oligonucleotide" ANALYTICAL BIOCHEMISTRY,ACADEMIC PRESS, SAN DIEGO, CA,US, vol. 250, 1997, pages 122-124, XP002106964 ISSN: 0003-2697 the whole document ---	1-16
A	WO 98 57159 A (CLINICAL MICRO SENSORS INC) 17 December 1998 (1998-12-17) the whole document ---	1-16
A	BANER J ET AL: "Signal amplification of padlock probes by rolling circle replication" NUCLEIC ACIDS RESEARCH,GB,OXFORD UNIVERSITY PRESS, SURREY, vol. 26, no. 22, 15 November 1998 (1998-11-15), pages 5073-5078, XP002112357 ISSN: 0305-1048 the whole document ---	1-12
P,X	WO 99 37819 A (KAYYEM JON FAIZ ;CLINICAL MICRO SENSORS INC (US)) 29 July 1999 (1999-07-29) the whole document -----	1-16

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 00/19889

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9820162 A	14-05-1998	US 6096273 A US 6090933 A AU 5196798 A EP 0939762 A	01-08-2000 18-07-2000 29-05-1998 08-09-1999
US 5854033 A	29-12-1998	AU 714486 B AU 1024097 A EP 0862656 A WO 9719193 A US 6143495 A	06-01-2000 11-06-1997 09-09-1998 29-05-1997 07-11-2000
US 5846717 A	08-12-1998	AU 1836497 A CA 2243353 A EP 0904286 A WO 9727214 A US 6001567 A US 5985557 A US 5843669 A US 6090606 A US 6090543 A US 5994069 A	20-08-1997 31-07-1997 31-03-1999 31-07-1997 14-12-1999 16-11-1999 01-12-1998 18-07-2000 18-07-2000 30-11-1999
WO 8605815 A	09-10-1986	AU 5667186 A EP 0216844 A	23-10-1986 08-04-1987
WO 9640712 A	19-12-1996	US 5824473 A AU 6166296 A EP 0871642 A US 5770369 A US 5952172 A	20-10-1998 30-12-1996 21-10-1998 23-06-1998 14-09-1999
WO 9857159 A	17-12-1998	AU 7967898 A EP 0988534 A	30-12-1998 29-03-2000
WO 9937819 A	29-07-1999	US 6063573 A AU 2473799 A EP 1051517 A AU 2473599 A WO 9957319 A AU 4072599 A WO 9957317 A	16-05-2000 09-08-1999 15-11-2000 23-11-1999 11-11-1999 23-11-1999 11-11-1999